Abstract

Background: Neuromyelitis optica (NMO) and multiple sclerosis (MS) often manifest similar symptoms. However, the distinction between the two diseases is particularly important for different therapies. The aim of this study is to determine whether these diseases can be distinguished based on cerebral iron deposits in the deep grey matter and whether there is a correlation between iron deposits, local deep grey matter atrophy and clinical severity of the disease.

Methods: 40 patients with relapsing-remitting MS (RRMS), 20 patients with NMO and 20 healthy subjects were examined at the MRI department of the 1st Faculty of Medicine of Charles University in Prague from December 2013 to March 2015. All patients with RRMS fulfilled the revised McDonald criteria, the diagnosis of NMO was based on Wingerchuk criteria. All 20 patients with NMO had positive AQP4-IgG. Quantitative susceptibility mapping (QSM) and volumometry of individual deep gray matter structures were performed. All patients with NMO and MS underwent simultaneous examination by a specialist in demyelinating diseases. Neurological disability was assessed by the Kurtzke Disability Status Scale (EDSS).

Results: Patients with NMO have higher magnetic susceptibility values in the substantia nigra compared to healthy controls. Patients with RRMS had lower magnetic susceptibility values in the thalamus. Patients with RRMS and healthy controls had atrophy of the thalamus, pulvinar and putamen compared to patients with NMO. In patients with RRMS, there was a correlation between neurological impairment and magnetic susceptibility in the putamen, a correlation between magnetic susceptibility and atrophy in the globus pallidus and putamen, and a correlation between atrophy and impairment in the putamen. None of these correlations were found in patients with NMO.

Conclusions: This study confirms that the disruption of brain iron homeostasis in NMO patients occurs in different structures than in RRMS patients. In contrast to RRMS patients, no association was found between iron deposition, neurological impairment, and local atrophy of deep grey matter structures in NMO patients.

Keywords: Neuromyelitis optica, multiple sclerosis, magnetic susceptibility, deep grey matter, EDSS, quantitative susceptibility mapping